

ARTHRAOXON HISPIDUS (GRAMINEAE)
IN THE UNITED STATES:
TAXONOMIC AND FLORISTIC STATUS

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During the fall of 1969, a population of *Arthraxon hispidus* (Thunb.) Makino, attributable to var. *hispidus* according to current treatments of the species, was discovered in an area of Maryland where the typical variety had not been previously recorded. This prompted further inquiry into the status of the species in this country, where both var. *hispidus* and var. *cryptatherus* (Hackel) Honda have been introduced from the native Oriental range of the species (Japan, China, Formosa, New Guinea, Philippines, Indochina, Ceylon, Kashmir and India). Examination of pertinent literature and of numerous specimens attributable to both varieties reveals that the species now has a more intensive distribution within a slightly more extensive range in the United States than at the time of the most complete recent account of it here (Hitchcock, 1950). Such examination also suggests that the species should be treated as a single, quite variable entity rather than maintained with the two varieties heretofore recognized.

Taxonomically, accounts of *Arthraxon hispidus* in this country to the present (Hitchcock, 1935; Blomquist, 1948; Hitchcock, 1950; Fernald, 1950; Gleason, 1952; Weintraub, 1953; Gilman, 1957; Gleason and Cronquist, 1963; Radford et al., 1968) have distinguished the two varieties, though some have accounted floristically for only one of them. Variety *cryptatherus* was first collected in the United States in the 1870's and the varietal name is based on an original quadrinomial proposed in 1889 (*A. ciliaris* Beauv. subsp. *langsдорffi* var. *cryptatherus* Hackel). Prior to that, specimens from this country were attributed to *A. ciliaris* without infraspecific designation or to other entities since placed in synonymy. The typical variety was first collected here in 1933, but was not reported as such in the literature until

1950 (Hitchcock, 1950). *A. hispidus*, and its typical variety, are based on *Phalaris hispida* Thunb., proposed in 1784.

The two varieties of *A. hispidus* are currently distinguished on the following basis: Awns absent, included within the glumes or only slightly exserted, and spikelets "generally smaller" in var. *cryptatherus*; versus, awns long-exsert and spikelets larger in var. *hispidus*. The original descriptions upon which the varieties are based confirm their distinction on these characters alone. Specimens from the United States attributed to both varieties (GH, MARY, US) clearly exhibit general and independent intergradations of these distinguishing characters. Presence of both sets of characters even occurs on the same plant, though infrequently. Examination of numerous specimens from throughout the native Asiatic range of *A. hispidus* (GH, US) indicates that even more intergradation of varietal characters occurs there. This suggests that further establishment of the species in the United States will result in a yet greater range of character overlap than is so far apparent here, approximating that of its native range, where it is very intensively established.

Recent collections from this country indicate that the two varietal conditions occur sympatrically, as is the case throughout the native range. Also, many specimens, from both ranges, with short awns and/or smaller spikelets appear somewhat depauperate. This raises the possibility that environmental factors alone may sometimes account for the occurrence of the set of characters ascribed to var. *cryptatherus*. In at least one case, collections made at the same site but at different times are clearly referable to different varieties (see list of specimens under Montgomery County, Maryland).

In his recent *Flora of Japan*, Ohwi (1965) does not recognize separate varieties of *A. hispidus* and calls attention to the great variability of the species. In line with this modern Asiatic treatment, it is proposed that the same taxonomic view of the species be adopted in this country, for

the following reasons: 1) original distinction of the two character states now attributed to separate varieties of *A. hispidus* occurred at a time when the species was yet imperfectly known but when "splitting" in the genus was rampant; 2) the actual situation obtaining in the species is one of great variability and independent character assortment and intergradation which does not allow a clear enough distinction of separate character complexes to warrant infraspecific division; 3) the two established varieties occur sympatrically and do not, therefore, exhibit any geographical pattern distinct enough to support taxonomic separation; 4) a strong possibility exists that environmental differences over time and space may account for much of the variability observed within the species, including those characters used to distinguish the varieties; 5) occurrence on the same plant of character states attributed to different varieties does not support any biological view of distinct taxonomic entities; and, 6) both characters used for varietal distinction are quantitative rather than qualitative in nature and vary independently of each other in some cases (awn condition is, for all practical purposes, a quantitative character and not one involving presence versus absence of structure — almost all specimens have at least rudimentary awns).

Based upon the above proposal, the nomenclatural status of the species is as follows (only names recently in use and their basionyms are cited):

Arthraxon hispidus (Thunb.) Makino, Bot. Mag. (Tokyo) 26: 214. 1912.

Phalaris hispida Thunb., Flora Japonica 44. 1784.

Arthraxon ciliaris Beauv., Agrost. 111. 1812.

A. ciliaris subsp. *langsдорffii* Hackel var. *cryptatherus* Hackel, Monogr. Agrost. 355. 1889.

A. cryptatherus (Hackel) Koidzumi, Bot. Mag. (Tokyo) 39: 301. 1925.

A. hispidus var. *cryptatherus* (Hackel) Honda, Bot. Mag. (Tokyo) 39: 277. 1925.

The type species of the genus *Arthraxon* is *A. ciliaris* Beauv.

Those so inclined might wish to recognize the two extreme phases of *A. hispidus* at the level of *forma*. However, formal recognition at that level is neither useful nor practicable, except for the separate purposes of micro-evolutionary study, and thus is not here proposed.

Hitchcock (1935), in the first full account of *A. hispidus* in the United States, reported var. *cryptatherus* from Pennsylvania to Florida and from Missouri, Arkansas and Oregon. By 1950, Chase in her revision of that work (Hitchcock, 1950), on the basis of additional collections (some reported in the literature in the interim, see Chase, 1937; Fernald, 1936, 1939 and 1941; Monachino, 1940), reported both varieties as follows: variety *hispidus* from "Maryland (near Washington, D.C.) [not the same location as the new one reported in this paper], Missouri (St. Louis) and Louisiana (Richland Co. [sic])"; var. *cryptatherus* from Pennsylvania to Florida and Tennessee, from Arkansas and from Washington. The treatments by Fernald (1950), Gleason (1952), Gilman (1957; northern Virginia and Maryland only) and Gleason and Cronquist (1963) followed Chase but were less precise and inclusive. Radford et al. (1968) have recently reported new stations in the Carolinas as a result of their intensive study of that area. In addition, evidently on the basis of their current study of the flora of the Southeastern United States, they report the species from Mississippi. Despite the significant contribution of this latter work, the most precise account of *A. hispidus* over its entire range in the United States remains that of Chase.

Based upon specimens examined (GH, MARY, US) and upon the reports by Radford et al. for the Carolinas, *Arthraxon hispidus* (varieties not distinguished) is now known in this country from a wide spectrum of wet to moderately dry habitats, including shallow water, shores of streams and lakes, sand bars, moist bottoms, low woods, ditches, roadsides, fields, gardens and pavement crevices.

The species is distributed here as follows: PENNSYLVANIA: Philadelphia (collections from 1800's only) and locally in Bedford Co. MARYLAND: locally in Baltimore, Montgomery and Prince Georges counties. DISTRICT OF COLUMBIA: locally in the upper Northwest. VIRGINIA: locally in northern counties near Washington, D.C. and southeastern coastal plain counties, and one station in Albemarle Co. NORTH CAROLINA: a few stations in the mountainous western counties, widespread but local in the piedmont (including Rutherford Co., not reported by Radford et al.), and locally in the northeastern and southeastern coastal plain counties. SOUTH CAROLINA: locally in the central and western piedmont and in Chesterfield Co. GEORGIA: locally in the northern counties and in Troup Co. FLORIDA: very locally in the northeastern Panhandle, possibly elsewhere (one collection with location given only as "Florida"). TENNESSEE: locally in Anderson, Campbell and Montgomery counties. ALABAMA: very locally in Talladega Co. and at Auburn. MISSISSIPPI: reported by Radford et al. but no specimens seen. MISSOURI: known only from one station at St. Louis. ARKANSAS: locally in the west-central and northwestern counties. LOUISIANA: locally in parishes close to the Mississippi River above Baton Rouge and one station in Richland Parish. OREGON: known only from one station at Portland.

There is a possibility that the species also occurs in New York. Monachino (1940) reported it from the grounds of the New York Botanical Garden and cited a collection which is presumably on deposit there. Whether the species persists there or occurs elsewhere in the state was not ascertainable from the literature and specimens seen.

Although the above distribution shows only slight change since 1950 in the overall range of the species here, it does show that it has become more firmly established within that range since then (i.e., when compared with the collections upon which Chase's report was based). Most likely, intensive field study, such as that recently done in the Carolinas, will reveal more extensive distributions in some of the other

states within the species range. Perhaps additional locations are already known and can be reported by those actively working with local floras. Certainly the present actual distribution must be greater than what is indicated by the holdings of major herbaria and must be increasing yearly. A broad ecological amplitude has evidently enabled *Arthraxon hispidus* to spread and flourish widely since its introductions into the United States.

Selected Specimens of Taxonomic and/or Floristic Significance.

[Asterisk (*) indicates locations new since Chase's report (Hitchcock, 1950); at least one specimen from each county of the range is included, except for counties in the Carolinas newly reported by Radford et al. (1968) for which no specimens were seen; abbreviations of herbaria follow the recommendations of Lanjouw and Stafleu (1964).]

PENNSYLVANIA. *Bedford Co.: *Berkheimer* 17684 (GH, US). Philadelphia: *Scribner* s.n., n.d. (US 740269); *Scribner*, in 1878 (US); **B??k*, in 1877, annotated by E. Hackel as *A. ciliaris* var. undet. (US); *Scribner* 86 (GH). MARYLAND. *Baltimore Co.: *Reed* 33143, see *Reed* (1965) (US). Montgomery Co.: *Benedict* 5440, with characters of var. *hispidus* (US); *Kiger* 209, 377, *near junction of Interstate Rts. 495 and 70-S (MARY, US); *Killip* 40187, this and *Benedict* 5440 are the only collections from the state prior to 1950 with the characters of var. *hispidus* and were the basis for Chase's report of that variety from Maryland (US); *Killip* 41388, collected from same general site as *Benedict* 5440 but four years later, somewhat depauperate looking, and with characters of var. *cryptatherus* (US); *Norton*, in 1940 (MARY); *Smith* 4918 (US). Prince Georges Co.: *Hermann* 11609 (US). DISTRICT OF COLUMBIA. *Allard* 11068 (GH); *Worthley*, in 1951 (US). VIRGINIA. *Albemarle Co.: *Davenport*, in 1959 (US). Alexandria: *Hotchkiss* 5560 (US). Arlington Co.: *Hermann* 9923 (GH) and s.n. on same date in 1938 (US); *Kiltz*, in 1960, *Ft. Myer (US). Elizabeth City Co.: *Fernald, Long & Fogg* 4758 (US). Fairfax Co.: *Chase* 12653 (US); *Fosberg* 30142 (US). Greensville Co.: *Fernald & Long* 13551 (GH). Sussex Co.: *Fernald & Long* 9517 (GH, US). NORTH CAROLINA. Brunswick Co.: *Blomquist* 4885 (GH). Guilford Co.: *McCrary*, in 1927 (US). Orange Co.: *Blomquist* 10946 (GH). *Rutherford Co.: *Blake* 12463 (US); *Freeman* 52484 (US). SOUTH CAROLINA. *Abbeville Co.: *Radford* 50846 (GH). Pickens Co.: *Newman*, in 1903 (US). GEORGIA. Cherokee Co.: *Duncan* 8926 (GH, US). *Clayton Co.: *Duncan* 10681 (US). Dawson Co.: *Duncan* 4290 (GH, US). *Elbert Co.: *Duncan* 10549 (US). *Floyd Co.: *Duncan* 13312 (GH). Troup Co.: *Young*, in 1922 (US). Walton Co.: *Duncan* 7893

(GH, US). FLORIDA. *Stokes*, in 1925 (US). *Gadsden or Liberty Co.: *Godfrey* 59971, at Aspalaga (GH). TENNESSEE. Anderson Co.: *Jennison* 3347 (US). Campbell Co.: *Underwood* 1373 (US). Montgomery Co.: **Clebsch*, in 1948 (US). ALABAMA. Auburn: "communicated by *G. Fick*," in 1929, but the state not included in Chase's 1950 report despite this specimen (US). *Talladega Co.: *Banks*, in 1959 (US). MISSOURI. St. Louis: *Steyermark*, in 1933 (US). ARKANSAS. Garland Co.: *Moore* 470156 (US); *Palmer* 24259 (GH); *Palmer* 26445 (US). Hot Springs Co.: *Hale* 2067 (US). *Montgomery Co.: *Demaree* 34326 (US). Washington Co.: *Demaree* 675 (US). LOUISIANA. *E. Feliciana Parish: *Thieret*, in 1965 (US). *Pointe Coupee Parish: *Thieret*, in 1964 (US). Richland Parish: *Silveus* 5395 (US). CULTIVATED. *Celarier*, in 1953, cultivated in nursery at Stillwater, Okla. from orig. coll. in District of Columbia (US). *Suksdorf* 5316, "raised from young plants collected on ballast at Portland, Oregon," evidently the sole basis both for Hitchcock's 1935 report from Oregon and for Chase's 1950 report from Washington (US).

LITERATURE CITED

- BLOMQUIST, H. L. 1948. The grasses of North Carolina. Durham. p. 197.
- CHASE, A. 1937. *Arthraxon hispidus* var. *cryptatherus* (Hack.) Honda in Pennsylvania. *Rhodora* 39: 100.
- FERNALD, M. L. 1936. Plants from the outer coastal plain of Virginia. *Rhodora* 38: 376-404.
- . 1939. Last survivors in the flora of tidewater Virginia. *Rhodora* 41: 529-559.
- . 1941. Another century of additions to the flora of Virginia. *Rhodora* 43: 485-553.
- . 1950. Gray's manual of botany, ed. 8. New York. p. 230.
- GILMAN, E. M. 1957. Grasses of the tidewater-piedmont region of northern Virginia and Maryland. *Castanea* 22: 1-105.
- GLEASON, H. A. 1952. The new Britton and Brown illustrated flora of the northeastern United States and adjacent Canada, vol. II. Lancaster, Penna. p. 240.
- , and A. CRONQUIST. 1963. Manual of the vascular plants of the northeastern United States and adjacent Canada. Princeton. p. 118.
- HITCHCOCK, A. S. 1935. Manual of grasses of the United States. U. S. Dept. Agr. Misc. Publ. 200. Washington, D.C. p. 725.
- . 1950. Manual of grasses of the United States, ed. 2, rev. A. Chase. U. S. Dept. Agr. Misc. Publ. 200. Washington, D.C. p. 748.
- LANJOUW, J., and F. A. STAFLEU. 1964. Index herbariorum I. The herbaria of the world, ed. 5. Utrecht.

- MONACHINO, J. 1940. *Arthraxon hispidus* var. *cryptatherus* in New York. *Rhodora* 42: 198-199.
- OHWI, J. 1965. Flora of Japan (in English), ed. F. G. Meyer and E. H. Walker. Washington, D.C. p. 192.
- RADFORD, A. E., H. E. AHLES and C. R. BELL. 1968. Manual of the flora of the Carolinas. Chapel Hill. p. 162.
- REED, C. F. 1965. New or additional records of grasses in Maryland and Delaware. *Rhodora* 56: 178-181.
- WEINTRAUB, F. C. 1953. Grasses introduced into the United States. U.S.D.A. Forest Service Agriculture Handbook No. 58. Washington, D.C. p. 13.

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ADDITIONS TO
THE FLORA OF THE BAHAMA ISLANDS

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During late December of 1968 I collected briefly on the Grand Bahama Island followed by a few days on Eleuthera till 2 January 1969. I returned to Eleuthera the following year and collected for about two weeks during the same December-January period. In total 204 taxa were found besides strictly cultivated plants, bryophytes and algae.

I was surprised on using the 50 year old Bahama Flora (Britton & Millspaugh, New York, 1920) to find that many of my collections represented plants new to the Bahamas and to either the Grand Bahama Island or to Eleuthera. These islands are among the largest in the archipelago, the first tragically undergoing heavy land development, the second of interest because of early settlement (1649) where garden escapes are common-place and often indistinguishable from the native vegetation. Little taxonomic research specific to the Bahamas has been attempted since the Flora, excepting a major contribution by Howard for the Bimini

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